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Need of Disability-Inclusive Disaster Management Plan for Sundarban Region: A case study of Hingalganj block, North 24 Parganas, West Bengal

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Abstract

The Sundarbans of both India and Bangladesh are very prone to occurrences of environmental hazards like cyclones, sea erosion, riverbank failure, climate change impacts, etc. With the negative effects of the ongoing epidemic, recent cyclones like Aila, Fani, Bulbul, Amphan, and Yaas leave people far more vulnerable to danger, especially disabled people. In consideration of this backdrop, the aim of the study is to evaluate and assess the level of vulnerability of Person with disabilities and inadequacy of proper disaster management policy for the Hingalganj block in the Sundarban region. The last updated district disaster management plan for the year 2024-25 of the district North 24 Parganas did not state any guidelines for people with disabilities, even though they have a two to four times higher risk of dying in a disaster, they also have a higher risk of injury and property loss, have more trouble getting out and finding shelter, and need more extensive medical and social services both during and after a disaster. This study is based on both primary and secondary data sources. Maps were generated with the help of remote sensing and GIS technologies to identify the level of vulnerability faced by disabled persons. This study reveals that the exclusion of people with disabilities in disaster management process has increased their vulnerability to disaster, and their absence from emergency management practice and policy formulation is a significant barrier to their safety and well-being. Officials of the District disaster management planners, public health officials, emergency response planners, and other stakeholders will benefit from this study to identify, visualize, and planning support for people with disabilities in the Sundarban area.

Keywords: Disability; Inclusive; Cyclones; Vulnerability; Disaster management

1. Introduction

The Oxford Dictionary defines a disability as an impairment that can be intellectual, limited, cognitive, improved, sensory, exercise-related, or a combination of these. A person's activities are affected by incapacity, which can occur from birth. It can occasionally occur in maturity. People with disabilities experience disability because of their interactions with environmental and attitude barriers that prevent them from fully and equally participating in society (CRPD -2006). According to WHO “"an all-encompassing term that encompasses limitations in activities, participation restrictions, and impairments." An impairment occurs when there is a problem with the structure or function of the body; an activity limitation occurs when an individual has trouble carrying out a task or action; and a participation restriction occurs when an individual has trouble participating in life situations. As a result, disability is a complicated phenomenon that reflects the interplay between an individual's physical characteristics and the social context in which they live”. In honor of the recent "International Day for Persons with Disabilities," the UN Secretary General reaffirmed the organization's commitment to collaborating with individuals with disabilities to create a sustainable, inclusive, and transformative future where all individuals, including men, women, girls, and boys with disabilities, can reach their full

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potential. Currently, an estimated 1.3 billion individuals, or around 16% of the world's population, live with a major impairment. The growing elderly population and the rise in noncommunicable diseases are contributing factors to this number (WHO). Although the frequency of disasters has increased globally, there hasn't been a noticeable change in the inclusion of people with disabilities in disaster risk reduction over the last ten years, according to the United Nations Office for Disaster Risk Reduction's (UNDRR) 2023 Survey Report on Persons with Disability and Disasters. According to UNHCHR, 2022, climate change and climate-related disorders will heighten the vulnerability of mobility disabilities. Disaster events have a disproportionately negative impact on people with disabilities.

According to the 2011 census, there are 1,00,09,781 people living in the district of North 24 Parganas, with an average density of 2204.6 people per square kilometer. As per the Census 2011, the differently abled population in India is 26.8 million rising from 21.9 million in 2001 or around 2.22% of the India's total population (NSO, 2021). The United Nations Sustainable Development Goals tagline, "No one is left behind," aligns with the goal of creating an inclusive and barrier-free society for people with disabilities. In keeping with its pledges to promote the well-being of all societal segments, including those with disabilities, the government has launched a number of welfare and development initiatives that align with our motto, "Sabka Saath, Sabaka Vikas, Sabka Vishwas," and is constantly cognizant of the unique requirements of individuals with disabilities.

The Sundarbans are a large archipelago of islands stretched across the Ganges-Brahmaputra-Meghna (GBM) delta in the north of the Bay of Bengal. It is home to over 4.4 million people in India and Bangladesh and the largest contiguous mangrove ecosystem in the world (Ghosh and others, 2015). Around 50 per cent of people in the Sundarbans live below the poverty line, and nearly 80 per cent of households pursue small-scale rural livelihoods in agriculture, fishing, and aquaculture (The World Bank,2014). Every year this region was devastated by numerous tropical cyclones. Due to storm and cyclones, the entire district is in the Very High Damage Risk Zone, with wind speeds potentially exceeding 200 km/h. Amphan on May 20, 2020, Yaas on May 26, 2021, "Fani" on May 4, 2019, "Bulbul" on November 9, 2019, and Cyclone "Aila" (highest wind speed of 120 kmph) on May 25, 2009, were the most recent storms to hit the Sundarban region. Since Cyclone Amphan co-occurred with the COVID-19 pandemic, people were uniquely vulnerable due to the direct and indirect impacts of a novel biological hazard. The geographical position of the Sundarban and the low mean sea level are the primary causes of flooding in this area. As the sea level rises, there is an ongoing risk of river water inflow, increasing the likelihood of flooding in the Sundarban.

Persons with disabilities (PWDs) represent a particularly vulnerable group that is substantially more likely to suffer harm or pass away than those without disabilities. Research indicates that in the aftermath of Cyclone Aila, communities in Hingalganj faced significant challenges, with PWDs encountering heightened barriers due to inadequate inclusive planning. (Pal et. Al, 2015) PWDs frequently experience negative effects and health risks that are exacerbated by their socioeconomic (e.g., poverty), demographic (e.g., age), and/or racial/ethnic (e.g., minority) status during such events. Due to the numerous barriers including financial, physical, and mental ones, people with disabilities are particularly vulnerable in all type of hazard or disaster or any situation. The need assessment of PWDs towards the disaster management in Sundarbans region was carried out for inclusive disaster management plan. The purpose of the study was to assess persons with disabilities and other at-risk groups were included in preparedness measures and generate initial data regarding impact and identify unmet needs to inform inclusive response in disaster management. This article highlights the findings from the rapid need assessment and provides practical recommendations to promote inclusion of persons with disabilities in preparedness and response measures towards disaster management.

1.1. Study area

The District Disaster Management Plan-2024-25 stated that the villages of Sandeshkhali-I, Sandeshkhali-II, Hasnabad Minakhan, and Hingalganj blocks are the most vulnerable, and this results in low agricultural production, which causes the working groups of the vulnerable blocks to migrate. The livelihood of these communities suffering financial losses during any crisis is considerable due to their susceptible and unstable populations. Hingalganj is a community development block that forms an administrative division in Basirhat subdivision of North 24 Parganas district in the Indian state of West Bengal. Surrounded by rivers on all sides, this small island, Hingalganj, is located at 22°28′15″N and 88°58′38″E.

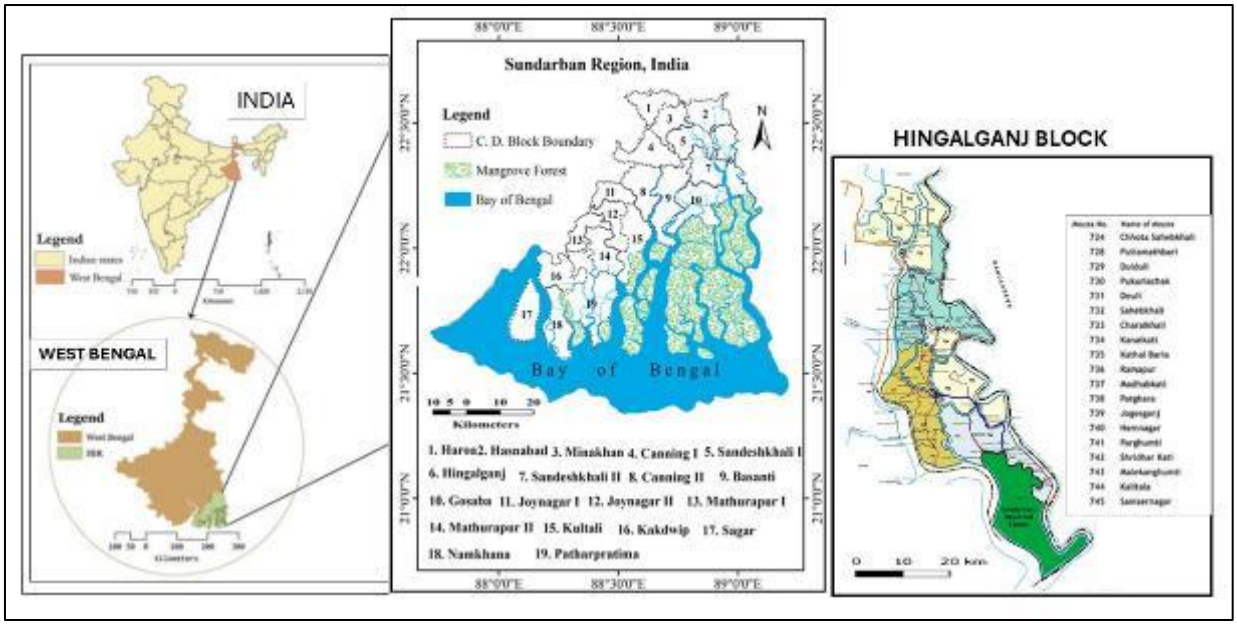

Figure 1 Location map of the study area

The block is part of the Ichhamati-Raimangal Plain, one of the three physiographic regions in the district located in the lower Ganges Delta. Extremely poor and vulnerable families of Hingalganj Block of North 24 Parganas were facing hardship due to lockdown for minimizing the spread of COVID 19. Cyclone AMPHAN has doubled their suffering since 20th May 2020 as the cyclone has destroyed infrastructure, thousands of houses, agricultural field, assets, life and livelihoods in both North and South 24 Parganas districts heavily. According to the report published by ACID, following are the most challenging problems faced by the residents of Hingalganj area.

More than 2750 Mud houses collapsed or were destroyed in these 5 GPs (Kalitala, Gobindakati, Jogeshganj, Sahebkhali and Dulduli Gram Panchayats of Hingalganj block) and People took shelter at various multipurpose shelters in the area.

- Domestic animals were kept in Cyclone Shelters.
- Thousands of Trees uprooted and damaged houses, electricity wire, blocked roads and pathways.
- Electric polls and Mobile Towers uprooted and lost connectivity with the area
- Water of ponds contaminated and got polluted
- Breach of river embankments in several places and saline water came inside villages and agricultural field

2. Methodology

The needs assessment was conducted in the Hingalganj block of district North 24 Parganas. The assessment comprised a review of secondary data sources, including data gathered from 56 of the most vulnerable families with disabilities from various impairment groups in the affected regions, as well as key informant interviews with groups of people with disabilities. A community-based qualitative semi-structured interview cum discussion was carried out with Mr. Haripada Sahu, a reputed person with disabilities using wheelchair and his associates at Mamudpur mouza and Panchayet officials of Kalitala gram panchayet of Hingalganj block to assess the primary needs of inclusive disaster management. Several online and over phone discussions were made to determine the factors responsible for their vulnerability and their demands for better livelihood.

3. Literature review

The World Health Organization (1996) states that a disability is "any restriction or inability to perform any activity in a manner or within a range that is thought to be normal for an individual. Activities, participation, and disabilities are all included under the umbrella word "disability." It draws attention to the negative effects of a person's environment and personal factors interacting with their health. (Karkal et al., 2014). In India, there are around 26 million impaired people, meaning that one in every 22 people is disabled, according to the 2011 Census of India., out of 1000, 20 are female and 24 are male, with significant differences in distribution between rural and urban areas. All people, including those with

disabilities, are guaranteed equality, freedom, justice, and dignity under the Indian Constitution, which also calls for an inclusive society. As a result, the governance policy paradigm has always taken the initiative to meet the needs of those who are less fortunate and give them equitable chances in all areas of growth. One such circumstance is disability, which calls for extra consideration at the levels of policy, implementation, and monitoring. Therefore, disability statistics take on particular significance and offer crucial facts on a variety of disability aspects for a cogent policy and action. Developing countries are more susceptible to the devastation and harm brought on by sudden calamities. Research has shown that those living in poverty are more susceptible to disasters and bear the brunt of their effects. (UNISDR, 2018; Wisner, Gaillard, & Kelman, 2012). The Indian Sundarban Biosphere Reserve represents one of the planet's major biodiversity hotspots, characterized by its extensive mangrove forests and ecologically dynamic environment (Mukhopadhyay, 2009). The study on an Analysis of Spatial Patterns of Disabled Persons in West Bengal reveals that disabled persons are highly concentrated in south Bengal, middle part and some areas of north Bengal have the less number (Islam MM, 2017). There is an enormous regional variation in the distributional patterns of male-female and rural-urban areas of the state. The Sundarban delta, characterized by its unique mangrove ecosystem, faces recurrent natural disasters that disproportionately affect its inhabitants. Among the most vulnerable are PWDs, who encounter significant barriers during emergencies, including inaccessible infrastructure, lack of tailored communication, and exclusion from decision-making processes. Recognizing and addressing these challenges is crucial for building resilient communities (Bal. A, 2025). Over 300,000 people, including woodcutters, fishers, and honey-pickers, depend on the Sundarbans for their livelihood. Their population is increasing at the expense of mangroves(Ghosh, et al. 2016). This low-lying area has long suffered from high vulnerability and exposure to extreme weather events due to a number of factors, such as a high dependency ratio, unemployment, lack of electricity, poor sanitation facilities, vector and waterborne diseases, and paved road availability (Sahana and others, 2019). Increased flooded areas and coastal salinity, sea level rise of up to 0.98 m by 2100, and net subsidence of 2.5 mm per year are all consequences of climate change that are expected to endanger the Sundarbans' biodiversity(Payo et al. 2016). The magnitude and severity of cyclones in the Bay of Bengal has increased since 1970 and has had an immediate effect on the level of coastal flooding, erosion and salinity (Hazra et al. 2002). Cyclone 'Amphan' (20 May 2020) was the most recent, as its landfall in the region was much more severe (240 km / hour) than its predecessors, Aila (120 km / hour) and Bulbul (155 km / hour), which occurred in 2009 and 2019 (Chakraborty and Thakur 2020). Persons with disabilities frequently lose their visibility and are denied access to critical services and emergency assistance. People with disabilities are disproportionately put in vulnerable positions during disasters (World Health Organization 2005). Policies which have the potential to be discriminatory toward people with disabilities, have the greatest impact during a disaster (Ripple & Jans 2008). Ono & Schmidlin (2011) state that absence of storm warnings, poor communication, weak housing, and dearth of shelters from strong winds are the reasons for the highest disaster-related death tolls in the world. Accessing warning information is a barrier for people with disabilities. It is necessary to transmit and distribute effective early warnings to the public. It is possible to create warnings for presentation in a variety of media, such as text, images, audio, and color-coded categories. Effective early warnings need to be communicated and disseminated to people (World Metrological Organization 2010). The government stated special measures for vulnerable groups, including women, children, persons with disabilities, and elderly people, to ensure that they are not left behind during disasters (DDMP,2025-26). The situation is very critical for people with disabilities living in the remote area as they require special attention during periods of disaster.

Figure 2 The damaged dam over the Goureshwar river at Hingalganj in North 24-Parganas that inundated Rupmari village

Figure 3 A) An inundated Jagannath Ghat in the Hingalganj block of the Sundarbans. B) The river waters gushed into villages through breached embankments destroying farms, houses and fishing ponds

Figure 4 Person with disability Affected by Amphan in Hingalganj b) Reconstruction works at Hingalganj

4. Challenges faced by disabled people due to disasters

The peculiar physical location of Sundarbans, which is marked by its deltaic topography and frequent exposure to natural disasters, made matters worse for PWDs. Additionally, this population is further marginalized by communication difficulties, including the lack of accessible disaster information. Although Disability-Inclusive Disaster Risk Reduction (DIDRR) programs have been initiated by CBM (Community-Based Inclusive Development) India, with an emphasis on training people from various communities and conducting mock drills, the facilities and hospitality have not been accessed by the people of Sundarban to date. Additionally, the development of focused treatments is hampered by the lack of disaggregated data on PWDs, putting in place a methodical PWD data collection system to support preparedness and risk assessments. Therefore, building and modifying shelters and evacuation routes so that every PWD can access them during disasters. The following section discusses the challenges faced by disabled persons during disasters in the study area.

5. Types of disability

The majority of participants had only a physical impairment (44%), 22% had hearing and speech problems, 12% had a mental disorder, 8% had visual disability, 4% had intellectual, physical, hearing, and speech problems, 4% physical, mental, hearing, and speech problems, and 2% had physical and mental impairment.

A majority of respondents (88%) noted that they have huge challenges during a disaster, 6% were not sure, and two percent did not experience any kind of challenges. Age group did seem to be a great factor in the challenges faced (Table 1). Across all age groups 51repondants out of 55 answered yest to facing challenges during the disasters and 88% participants mentioned huge challenges. All individuals in the age group of above 60 stated about the challenges.

Table 1 Relationship between age group and challenges faced during disaster

Age group	Challenges faced during a disaster in year	Challenges faced during a disaster in year	Challenges faced during a disaster in year
Age group	Yes	No	Not sure
5 to 14	9	1	0
15 to 40	17	3	0
40 to 60	11	0	1
Above 60	14	0	0

Food security and Livelihoods were identified as the primary priority area for assistance. 78% of respondents reported that they have less than a week's supply of food. Only 9% of respondents reported access to goods in the market at the present time. Among the respondents who replied not able to access goods in the market, the closure of the market due to COVID-19 restrictions was cited as a major reason.

5.1. Loss of Livestock and Livelihood

25% of respondents reported that livestock had been lost, and 54% reported that livelihoods had been lost due to the cyclone. Among the respondents reporting loss of livestock, the majority reported loss of poultry.

5.1.1. Health and Hygiene

Shelter: 81% of respondents reported partial or complete damage to their shelter. Over 50% of respondents reported that drinking water sources have been contaminated and sanitation facilities destroyed, while over 30% reported that safe drinking water was available and sanitation facilities exist, but they are unable to access them due to inaccessible routes or inaccessible structures. 67% of respondents said they did not have access to appropriate primary health care should they need it.

5.1.2. Early Warning system

However, 23% of respondents said early warning systems were not accessible. 71% of persons who reported a lot of difficulties hearing or cannot do at all said the early warning systems were not accessible. 66%of persons who reported a lot of difficulties seeing or who cannot do at all said the early warning systems were not accessible.

- Inaccessible evacuation measures and shelters create barriers for persons to safely evacuate
- 20% of respondents did not notice the warnings to evacuate.

5.1.3. Respondents' perceptions about the disaster's outcome:

Respondents have different perceptions regarding the results of the disaster. Among them 43% mentioned destruction of property, 5% mentioned loss of human life, 32% mentioned economic loss, 13% mentioned loss of human life, and 5% of participants mentioned ecological destruction. The majority (60%) believed that disaster is a curse of God/Allah, and only 40% believed that the causes of disasters are natural.

5.1.4. Crucial areas to support individuals with disabilities in their rehabilitation and managing their disabilities:

According to the perceptions of respondents(figure-2), the most essential areas to facilitate managing their disabilities and rehabilitation following a disaster are food (48%), water (22%), housing (25%), and communication (3%) and health and sanitation (2%).

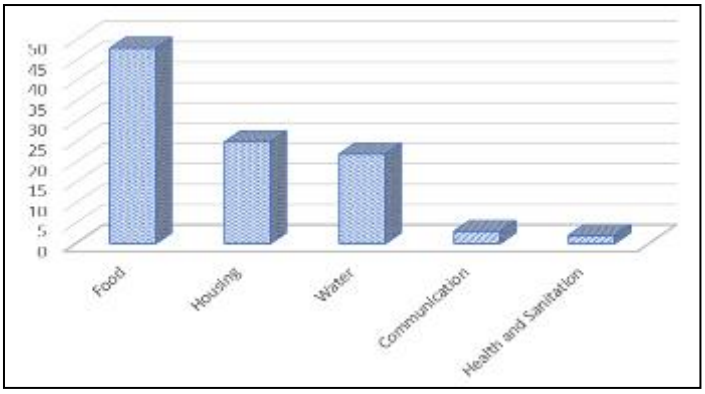

Figure 5 Important area for coping and rehabilitation for PWDS

The most reason behind the challenges they faced is the unfavorable condition of the surrounding area they lived(table-2). About 41% of respondents mentioned the unfavorable situation of the area. 19% respondents stated about their poor mental status as they have limited access to the disaster management resources. 13% participants mentioned about the poor physical status of the area. They mainly mentioned the poor connectivity, poor supply of electricity and minimal relief materials. 17% respondents stated about the environmental challenges like climate change, frequent cyclonic landfall, heavy raining and land-water degradation.

Table 2 Challenges faced during disaster

Types of challenges face	Percentage
Poor Physical status	13
Poor mental status	19
Unfavourable condition	41
Environmental challenges	17
Poor livelihood condition	10

5.1.5. Preparedness for disasters and the coordination of services:

According to the respondents, the main causes of disasters were a curse from God (90%) and natural causes (10%). The respondents of this study did not mention other causes such as climate change, ice melting, greenhouse effects, etc. For the last ten years, they commonly experienced floods (72%), riverbank erosion (24%), and fire or drought (2%).

Cyclone Amphan and the COVID-19 pandemic co-occurring at the same time and place compounded the impacts of each by reducing resilience and hindering response efforts in the affected areas. In the wake of Cyclone Amphan, health centres were damaged, reducing the capacity of the COVID-19 response effort.

5.1.6. ***Management recommendations****:*

Due to its complexity and multifaceted nature, disability is a cross-cutting problem in the 2030 Agenda for Sustainable Development, which presents several difficulties for measuring and gathering data. People with disabilities suffer enormously during disasters. As noted in the present study, people with disabilities have a variety of different challenges during disaster. PWDs experienced unfavorable conditions, poor physical status, poor mental status, and environmental challenges. As a result, they face difficulty to adjust with the situation. This study has found that the key recommendations to help people with disabilities cope better during a disaster are to strengthen the community, raise awareness of their needs, carry out mock drills, use sign language and warning signs, make the environment more accessible and use advanced warning systems and loud-speaker announcements. They can work with the government to improve public physical accessibility for people with disabilities. Exact residence location, Sex, age and disability disaggregated data needs to be collected to inform appropriate response planning. Humanitarian assistance must consider specific measures are put in place to ensure persons with disabilities access humanitarian assistance on an equal basis with others and must consider the specific requirements of persons with disabilities.

Recommendations emphasize universal access to evacuation measures and centers.

Disaster preparedness initiatives must incorporate individuals with diverse disabilities to promote awareness of inclusive strategies.

5.1.7. Training & Preparedness for person with disabilities:

Provide local volunteers, NGOs and disaster response teams (NDRF) with disability sensitization training to minimize discrimination by teaching staff members about the many forms of disabilities, proper behavior, and their rights to promote inclusive working environment. Provide PWD-specific "Disaster Kits" that include appropriate paperwork, assistive technology (such as white canes and hearing aid batteries), and necessary medications.

5.1.8. Evacuation priority for the disabled person:

Evacuation protocols require full priority and accessibility, featuring timely delivery of clear early warning messages, pre-arranged local government transport support, and pre-designated reachable evacuation sites. Provide pre-planned, customized transportation arrangements (such as adapted boats or cars) for people in wheelchairs or those who are bedridden to get them from isolated, low-lying locations.

Make sure the evacuation routes are clearly marked and easy to follow.

- Accessible Multi-purpose Cyclone shelters:

Cyclone shelters demand comprehensive accessibility, including newly constructed accessible facilities, communication of shelter information in user-friendly formats, and equitable distribution of relief supplies.

- Shelter design:

Inclusive shelter planning and selection are essential, involving collaboration with disability organizations for identifying affected individuals and ensuring accessibility in designs, access paths, and routes to latrines (communal or private).

- Pre-Disaster inclusive actions for the PWDs:

Identify and map all individuals with disabilities within the community. Integrated mapping using remote sensing and GIS technologies to prepare a accessible map and provide to the community and volunteers as well as to the disaster response teams positively.

Strengthen embankments and maintain regular mock drills involving PWDs to build inclusive capacity to prevent, mitigate, and handle disasters by ensuring that emergency plans account for the most vulnerable members of society.

- Special Food security measures for the disabled person:

Food security and livelihood programs should ensure accessibility through options like home delivery for distributions and diverse, disability-friendly choices in conditional cash or voucher assistance for early recovery.

- Need of Inclusive Health interventions:

Health services require inclusivity, with accessible rehabilitation (including assistive devices), management of pre-existing conditions, and medical care available during and post-disaster. For example, the 2016 Act requires the inclusion of disability-specific care in National Health Programs, as it ensures a right to health. PWDs are unable to receive the appropriate care in the majority of rural hospitals because of a lack of ramps, accessible restrooms, and adjustable equipment.

Overall, the need for an inclusive disaster management plan for people with disabilities ought to promote local government planning and coordination to develop and implement a more integrated and cohesive disaster preparedness plan for the Sundarbans' struggling and marginalized populations.

6. Conclusion

The research highlights a major flaw in disaster management systems: the routine neglect of Persons with Disabilities (PwDs) in at-risk areas like the Sundarbans. This region battles worsening climate dangers, from rising seas to severe storms such as Amphan and Yaas, yet North 24 Parganas' district plans offer no targeted protections for this vulnerable group. PwDs endure 2-4 times greater death rates in disasters. Shockingly, 81% saw their homes damaged, and most can't reach clean water or toilets due to impassable paths and buildings. Early alerts fall short, with 71% of hearing-impaired and 66% of visually impaired people unable to use them. The overlap of poverty, isolation, and disability forms a "double burden," especially during overlapping crises like COVID-19.

For a truly resilient, inclusive approach that leaves "no one behind," the study pushes for Disability-Inclusive Disaster Risk Reduction (DIDRR). The disaster management plan should include the followings a) Building a robust data system tracking age, sex, and disability details for better-targeted aid. b) Upgrading shelters and escape paths to accommodate mobility aids. c) Multi-channel alerts via sign language, text, visuals, and announcements. d) Empowering communities with PwD-focused training for responders and participatory drills.

Ultimately, safeguarding Sundarbans' overlooked groups requires embedding inclusive health and food support directly into measures the core of local government planning about disaster management.

Compliance with ethical standards

Acknowledgement

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Disclosure of conflict of interest

There is no conflict of interest.

References

[1] Basheer Ahammed, K. K., and Arvind C. Pandey. "Characterization and Impact Assessment of Super Cyclonic Storm AMPHAN in the Indian Subcontinent Through Space Borne Observations." *Ocean & Coastal Management*, 2021, 205, 105532. Https://doi.org/10.1016/j.ocecoaman.2021.105532.

[2] Brady, M., Davila, M., and Lucca, M. D. *Disaster and Emergency Preparedness: Report of the 2006 Regional Census and Survey of Persons with Disabilities*. Http://www.healthcouncil.org/publications/pwd.pdf.

[3] Chakraborty, Tamali, and Barun Thakur. "Sundarbans Needs Immediate Help."thestatesman,4July2020. Https://www.thestatesman.com/opinion/sundarbans-needs-immediate-help-1502905854.html.

[4] Danda, Anamitra A., et al *State of Art Report on Biodiversity in Indian Sundarbans*. WWF-India, (2017). Https://www.wwfindia.org/?16961%2fstate-of-Art-Report-on-Biodiversity-in-Indian-Sundarbans.

[5] District Disaster Management Plan 2025-26, North 24 Parganas, Govt. Of West Bengal, https://north24parganas.gov.in/notice/district-disaster-management-plan-2025-26-north-24-parganas/

[6] Ghosh, Manoj Kumer, Lalit Kumar, and Chandan Roy. "Mapping Long-Term Changes in Mangrove Species Composition and Distribution in the Sundarbans." *Forests*,2016, 7(12), 305. Https://doi.org/10.3390/f7120305.

[7] Ghosh, Aditya, et al.,"The Indian Sundarban Mangrove Forests: History, Utilization, Conservation Strategies and Local Perception." *Diversity*,7(2), 2015,149–169. Https://doi.org/10.3390/d7020149.

[8] Ghosh, Soumen, and Bimal Mistri., "Assessing Coastal Vulnerability to Environmental Hazards of Indian Sundarban Delta Using Multi-Criteria Decision-Making Approaches." *Ocean & Coastal Management*, 2021, 209, 105641. Https://doi.org/10.1016/j.ocecoaman.2021.105641.

[9] Hoque, M. A. A., et al. "Cyclone Vulnerability Assessment of the Western Coast of Bangladesh." *Geomatics, Natural Hazards and Risk*, 2021, 12(1), 198–221. Https://doi.org/10.1080/19475705.2020.1867652.

[10] Hazra, Sugata, et al.,"Sea Level and Associated Changes in the Sundarbans." *Science and Culture*,2001, 68(9), 309–321.

[11] Islam, Md Tariqual., "Vegetation Changes of Sundarbans Based on Landsat Imagery Analysis Between 1975 and 2006." *Landscape & Environment*,2014, 8(1), 1–9.

[12] Islam, M, N., An Analysis of Spatial Patterns of Disabled Persons in West Bengal Journal of Disability Studies (IJDS). 2017, 4(2),137-145.

[13] Karkal, R.S., Shihabuddeen, I., Disability Benefits for persons with mental illness in India: Challenges for implementation and utilization, Delhi Psychiatry Journal,2014, 17 (2), 248-252.

[14] Khan, Md J., et al., "Towards an Efficient Storm Surge and Inundation Forecasting System over the Bengal Delta: Chasing the Super-Cyclone Amphan." *Natural Hazards and Earth System Sciences Discussions*, 2020, 1–29. Https://doi.org/10.5194/nhess-2020-340.

[15] Kumar, Shubham, et al., "Influence of Super Cyclone 'Amphan' in the Indian Subcontinent Amid COVID-19 Pandemic." *Remote Sensing in Earth Systems Sciences*, 2021,4(1), 1–8. Https://doi.org/10.1007/s41976-021-00048-z.

[16] Mukhopadhyay, A., *Cyclone Aila and the Sundarbans: An Enquiry into the Disaster and Politics of Aid and Relief*. Mahanirban Calcutta Research Group, 2009, 18–20.

[17] National Statistical Office, India. *Persons with Disabilities (Divyangjan) in India - A Statistical Profile: 2021*. Ministry of Statistics and Programme Implementation, Government of India, 2021, p. 2. Https://www.mospi.gov.in.

[18] Ono, Y., and T. W. Schmidlin., "Design and Adoption of Household Tornado Shelters for Bangladesh." *Natural Hazards*, 2011, 56, 321–330.

[19] Pal, S., et al., "Understanding Disaster Risk Reduction: A Study on Knowledge, Attitude and Practices of Eight Aila Hit Villages of Hingalganj Block, North 24 Parganas, W.B." *International Journal of Inclusive Development*, 2015, 1(2), 29–37.

[20] Payo, Andres, et al., "Projected Changes in Area of the Sundarban Mangrove Forest in Bangladesh Due to SLR by 2100." *Climatic Change*, 2016, 139(2), 279–291. Https://doi.org/10.1007/s10584-016-1769-z.

[21] Sahana, Mehebub, et al., "Assessing Socio-Economic Vulnerability to Climate Change-Induced Disasters: Evidence from Sundarban Biosphere Reserve, India." *Geology, Ecology, and Landscapes*,2019, 5(1), 40–52. Https://doi.org/10.1080/24749508.2019.1700670.

[22] Ripple, J., and L. Jans. "Promising Practice in Workplace PAS: Support Services Assistants.". Http://www.pascenter.org/workplace_pas/California_pp.php, 2008.

[23] UNISDR. *Economic Losses, Poverty & Disasters: 1998–2017*. 2018. Https://www.unisdr.org/we/inform/publications/61119.

[24] The World Bank., *Building Resilience for Sustainable Development of the Sundarbans: Strategy Report*. Report No. 88061-IN, Washington, D.C. 2014

[25] World Health Organization. *Global Report on Health Equity for Persons with Disabilities*. Geneva: World Health Organization, ISBN 978-92-4-006360-0., 2022 https://www.who.int/publications/i/item/9789240063600.

[26] Wisner, B., Gaillard, J. C., and Kelman, I,"Framing Disaster: Theories and Stories Seeking to Understand Hazards, Vulnerability and Risk." In *Handbook of Hazards and Disaster Risk Reduction*, edited by B. Wisner, J. C. Gaillard, and I. Kelman, Routledge, 2012, 47–62.

[27] World Meteorological Organization, *Guidelines on Early Warning System and Application of Nowcasting and Warning Operations*. 2010, http://www.wmo.int/pages/prog/amp/pwsp/documents/PWS-21.pdf.

[28] World Meteorological Organization, *State of the Global Climate* WMO-No. 1264, 2021. Https://library.wmo.int/doc_num.php?Explnum_id=10618.

[29] World Health Assembly, 49. (1996). The world health report1996 :fighting disease ,fostering development. World Health Organization. Https://iris.who.int/handle/10665/178481

[30] World Health Organization. *Disasters, Disability and Rehabilitation*. 2005.,2014, http://www.who.int/violence_injury_prevention/other_injury/en/disaster_disability.pdf.